

Serial No. 10/815,033

Page 2 of 15

**IN THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**LISTING OF CLAIMS:**

1           1.       (original) A method comprising:  
2           modulating the output of an optical source to optically encode electronic data  
3           using phase shift keying (PSK) to generate an optical signal; and  
4           alternating the polarization of the phase shift keyed optical signal using a  
5           modulator such that successive optical bits have substantially orthogonal polarizations to  
6           generate an alternate polarization PSK (APol-PSK) signal.

1           2.       (original) The method of claim 1 wherein the modulator is a phase  
2           modulator driven by a sinusoidal RF voltage.

1           3.       (original) The method of claim 1 wherein the modulator is a phase  
2           modulator driven by a train of square pulses.

1           4.       (original) The method of claim 1 wherein the optical signal is launched  
2           into the modulator having a polarization oriented at a predetermined angle such that the  
3           polarization of successive optical bits of the output signal are substantially orthogonal.

1           5.       (original) The method of claim 1 wherein the modulator is a Mach-  
2           Zehnder modulator including a polarization rotation device in at least one arm.

1           6.       (original) The method of claim 5 wherein the polarization rotation device  
2           is a half-wave plate.

544697-1

Serial No. 10/815,033

Page 3 of 15

1        7.        (original) The method of claim 5 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1        8.        (original) The method of claim 5 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1        9.        (original) A method of APol-PSK transmission comprising:  
2        using an electronic data signal to drive a Mach-Zehnder modulator having a  
3 polarization rotation device in at least one arm to provide simultaneous polarization  
4 alternation and optical data encoding by phase shift keying to generate an APol-PSK  
5 signal.

1        10.       (original) A method comprising:  
2        precoding an electronic data signal;  
3        modulating the output of an optical source using the precoded electronic data  
4 signal and differential phase shift keying between two optical bits separated by an even  
5 number of bit periods to generate an encoded optical signal; and  
6        alternating the polarization of the encoded optical signal using a modulator such  
7 that successive optical bits have substantially orthogonal polarizations to generate an  
8 APol-DPSK signal.

1        11.       (original) The method of claim 10 further comprising demodulating the  
2 APol-DPSK signal using an even bit delay line interferometer.

1        12.       (original) A method of APol-DPSK transmission comprising:  
2        precoding an electronic data signal;  
3        using the precoded electronic data signal to drive a Mach-Zehnder modulator  
4 including a polarization rotation device in at least one arm to provide simultaneous  
5 polarization alternation and optical data encoding by phase shift keying between two  
6 optical bits separated by an even number of bit periods to generate an APol-DPSK signal.

544697-1

Serial No. 10/815,033

Page 4 of 15

1           13.   (original) The method of claim 12 wherein the polarization rotation device  
2 is a half-wave plate.

1           14.   (original) The method of claim 12 further comprising demodulating the  
2 APol-DPSK signal using an even bit delay line interferometer.

1           15.   (original) An optical transmitter for APol-PSK transmission comprising:  
2 an optical source,  
3 an optical phase-shift-keying data modulator optically coupled to the optical  
4 source; and  
5 a polarization alternator optically coupled to the data modulator to provide  
6 polarization alternation of the output of the data modulator.

1           16.   (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a phase modulator driven by a sinusoidal RF voltage.

1           17.   (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a phase modulator driven by a train of square pulses running at half the bit rate.

1           18.   (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a modified Mach-Zehnder modulator having a polarization rotation device in one arm.

1           19.   (original) The apparatus of claim 18 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1           20.   (original) The apparatus of claim 18 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1           21.   (original) The apparatus of claim 15 wherein the polarization alternator is  
2 a Mach-Zehnder modulator having two complementary output ports, and wherein the

Serial No. 10/815,033

Page 5 of 15

- 3 apparatus further comprises a polarization beam combiner for combining outputs from  
4 the two output ports of the Mach-Zehnder modulator.

1 22. (original) The apparatus of claim 21 wherein at least one arm of the  
2 modulator is driven by a sinusoidal RF voltage.

1 23. (original) The apparatus of claim 21 wherein at least one arm of the  
2 modulator is driven by a train of square pulses running at half the bit rate.

1 24. (currently amended) An optical transmitter for APol-DPSK transmission  
2 comprising:  
3 an optical source,  
4 a precoder device for precoding an electronic data signal;  
5 an optical phase-shift-keying data modulator optically coupled to the laser source  
6 and driven by a precoded electronic data signal from the precoder device to produce an  
7 optical DPSK signal wherein electronic data to be transmitted is optically encoded by the  
8 data modulator as differential phase shift keying between two optical bits separated by an  
9 even number of bit periods; and  
10 a polarization alternator optically coupled to the data modulator to provide  
11 polarization alternation of the output of the data modulator.

1 25. (original) An optical transmitter for APol-PSK transmission comprising:  
2 an optical source;  
3 a Mach-Zehnder (MZ) modulator device optically coupled to the laser source  
4 having a polarization rotation device in one arm; and  
5 drive circuitry coupled to the MZ modulator device to drive a MZ modulator to  
6 simultaneously provide polarization alternation and optical data encoding of an optical  
7 signal using phase shift keying.

1 26. (original) An optical transmitter for APol-DPSK transmission comprising:  
2 an optical source;

Serial No. 10/815,033

Page 6 of 15

3 a precoder;  
4 a Mach-Zehnder (MZ) modulator device optically coupled to the laser source  
5 having a half-wave plate in one arm; and  
6 drive circuitry coupled to the MZ modulator device to drive a MZ modulator  
7 using a precoded data signal from the precoder to simultaneously provide polarization  
8 alternation and optical data encoding of an optical signal using phase shift keying.

1 27. (original) An optical transmission system for transmitting APol-PSK  
2 signals comprising:  
3 an optical source,  
4 an optical phase-shift-keying data modulator optically coupled to the optical  
5 source; and  
6 a polarization alternator optically coupled to the data modulator to provide  
7 polarization alternation of the output of the data modulator.

1 28. (currently amended) An optical transmission system for APol-PSK  
2 transmission comprising:  
3 an optical source,  
4 a modulator means having a polarization rotation device to provide simultaneous  
5 polarization alternation and optical data encoding by phase shift keying to generate an  
6 APol-PSK signal.

1 29. (currently amended) An optical transmission system for APol-DPSK  
2 transmission comprising:  
3 an optical source;  
4 a precoder device for precoding an electronic data signal;  
5 an optical phase-shift-keying data modulator optically coupled to the laser source  
6 and driven by a precoded electronic data signal from the precoder device to produce an  
7 optical DPSK signal wherein electronic data to be transmitted is optically encoded by the  
8 data modulator as differential phase shift keying between two optical bits separated by an  
9 even number of bit periods; and

544697-1

Serial No. 10/815,033  
Page 7 of 15

10 a polarization alternator optically coupled to the data modulator to provide  
11 polarization alternation of the output of the data modulator.

1 30. (original) An apparatus for generating an APol-PSK optical signal  
2 comprising:  
3 means for encoding electronic data using phase shift keying (PSK) to generate an  
4 optical signal; and  
5 modulator means for alternating the polarization of the optical signal to generate  
6 an alternate polarization PSK (APol-PSK) signal.